A Biometric for Life
Potential for a Lifetime Breeder Document?

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Agenda

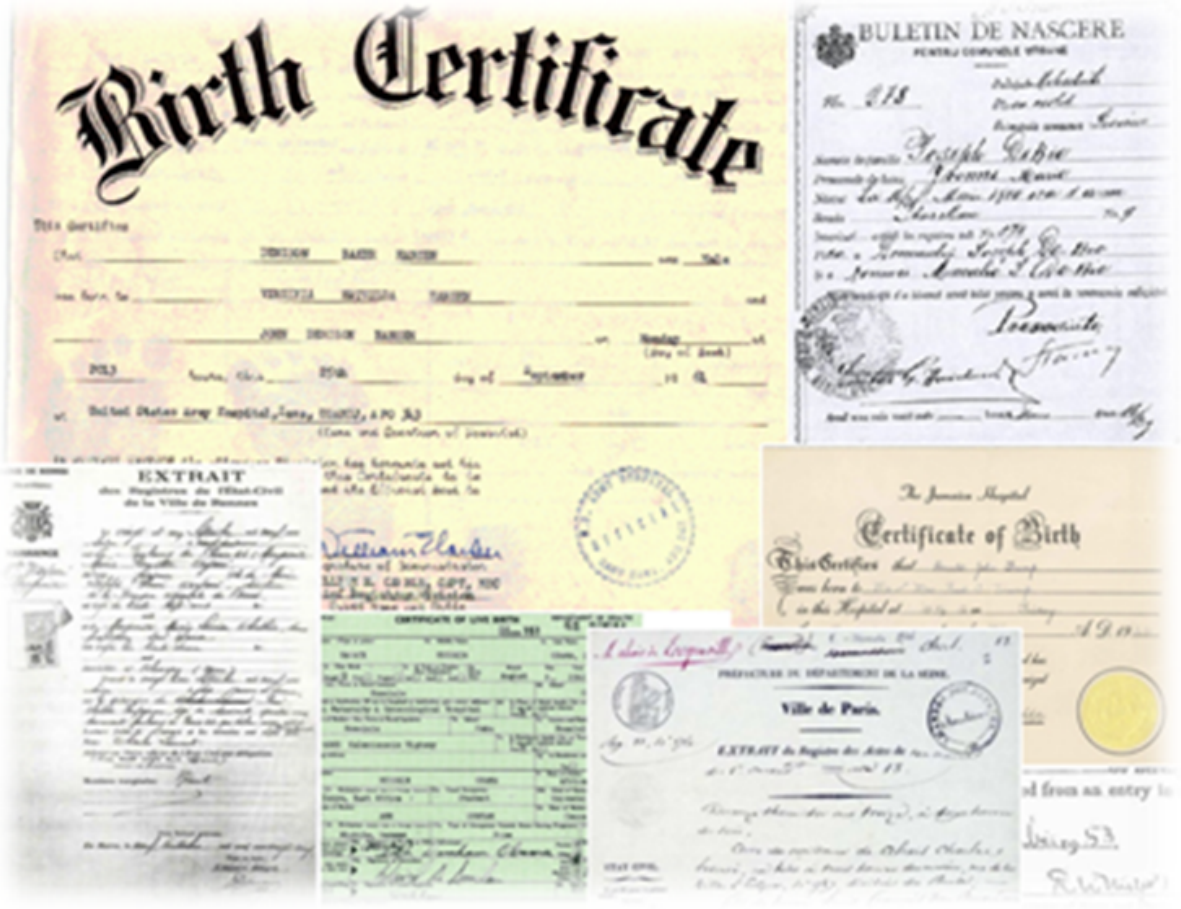
Introduction – Motivation

- A birth certificate is an example of a breeder document which is used to apply for other personal documents like e-Passports but also national ID cards or Bank ID.
- The issuance of a birth certificate must be trustworthy and fraud prone, otherwise issued documents that are issued on the basis of a falsified foundation (birth certificate)
- It is essential that the breeder documents are uniquely and permanently linked to the individual to whom it was issued.

Possible Solution?

Biometrics provide a strong link between an individual and documents!

Introduction – Motivation



- There is a need for harmonisation of breeder documents (especially birth certificates) as well as their issueing processes!

Introduction – Research Questions

- Does biometric ageing hinder the integration of biometrics to breeder documents (e.g. birth certificates)?
- Which biometric characteristics are most stable over a long (life-time) time-span?
- Which biometric characteristics are most suitable to be captured at early ages from an ethical point of view?
- Can potential ageing effects be modelled and systems be parametrized to actively handle ageing?

European FIDELITY Project – Facts

- FIDELITY is a project funded by the European Commission, under the Security theme of the Seventh Framework Programme
- Duration of the project: 2012 – 2016
- Nr. of Partners: 19 (University of Bologna, Gjøvik University College, MORPHO, KU Leuven, Hochschule Darmstadt, etc.)
- Funding: $>$ €12 Million

European FIDELITY Project – Goals

Major Goals of the Project:

1. Develop solutions for fast and secure authentication of individuals at border crossings, while protecting individual privacy.
2. Propose solutions to improve the issuance process of breeder documents in order to reduce fraud.

Focus

The FIDELITY project covers the whole trust chain in the travel document based identity authentication scenario!

European FIDELITY Project – Goals (cont'd)

- Increase security of the physical document.
- Propose a harmonised layout and data set structure.
- Link the document to the bearer.
- Establish a standardised verification process.
- Standardise issuing processes.
- Feed project results to relevant international standardisation committees (e.g. ICAO, ISO/IEC JTC1 SC37).
- Proposing technically-viable solutions that are acceptable within the ethical and legal contexts of the larger European Union.

Harmonized Breeder Documents – Proposal

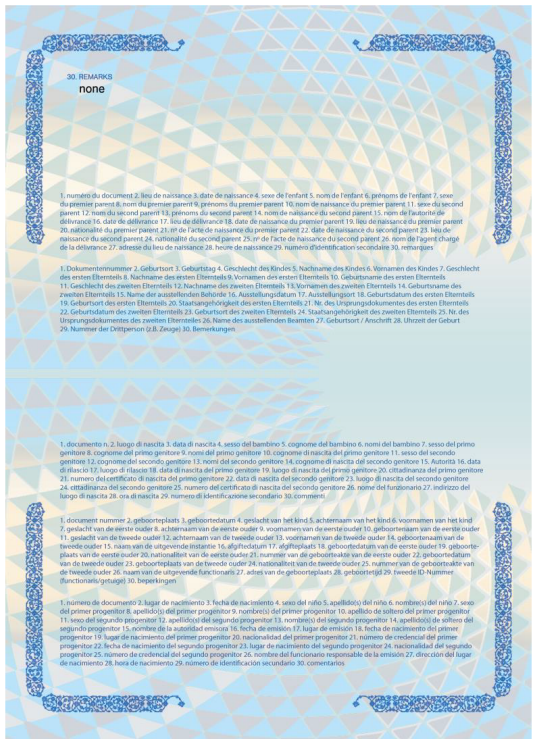
Based on an analysis of birth certificates in Europe with respect to security features, data entries, dissemination processes and administration processes aims are identified:

1. Cover backward compatibility to existing processes,
2. Enhance privacy and improve document and system security,
3. Optimize processes with respect to effort, costs and security, and
4. Harmonize breeder documents by using a common layout and common data entries.

Harmonized Breeder Documents – Proposal (cont'd)


BIRTH CERTIFICATE
GEBURTSURKUNDE/CERTIFICATE DE NAISSANCE

01. DOCUMENT NUMBER: D001456BABCD123
02. PLACE OF BIRTH: Brandenburg
03. DATE OF BIRTH: 15.12.1990
04. SEX OF THE CHILD: F
05. SURNAME OF THE CHILD: Mustermann
06. FORENAMES OF THE CHILD: Erika, Maria, Sophia
07. SEX OF THE FIRST PARENT: F
08. SURNAME OF T. F. P.: Mustermann
09. FORENAMES OF T. F. P.: Katharina
10. BIRTH NAME OF T. F. P.: Schmidt
11. SEX OF THE SECOND PARENT: M
12. SURNAME OF T. S. P.: Mustermann
13. FORENAMES OF T. S. P.: Jakob Thomas
14. BIRTH NAME OF T. S. P.: –
15. NAME OF THE ISSUING AUTHORITY: Standesamt Mitte
16. DATE OF ISSUANCE: 22.12.1990
17. PLACE OF ISSUANCE: Berlin
18. DATE OF BIRTH OF THE FIRST PARENT: 31.12.1965
19. PLACE OF BIRTH OF T. F. P.: Hamburg, Germany
20. CITIZENSHIP OF T. F. P.: German
21. CREDENTIAL NUMBER OF T. F. P.: D0012345XYZ1234
22. DATE OF BIRTH OF THE SECOND PARENT: 01.02.1960
23. PLACE OF BIRTH OF T. S. P.: Wien, Austria
24. CITIZENSHIP OF T. S. P.: Austrian
25. CREDENTIAL NUMBER OF T. S. P.: AUT98765ABCDEFG
26. NAME OF THE ISSUING OFFICER: Klaus Mueller
27. BIRTH PLACE ADDRESS: Zentralkrankenhaus, Musterstr. 1, 12345 Brandenburg
28. TIME OF BIRTH: 21:00
29. SECONDARY IDENTIFICATION NUMBER: 123456789ABCDE
Signature/Unterschrift/Signature


30. REMARKS
none

1. numéro du document 2. lieu de naissance 3. date de naissance 4. sexe de l'enfant 5. nom de l'enfant 6. prénoms de l'enfant 7. sexe du premier parent 8. nom du premier parent 9. prénoms du premier parent 10. nom de naissance du premier parent 11. sexe du second parent 12. nom du second parent 13. prénoms du second parent 14. nom de naissance du second parent 15. nom de l'autorité de délivrance 16. date de délivrance 17. lieu de délivrance 18. date de naissance du premier parent 19. lieu de naissance du premier parent 20. nationalité du premier parent 21. nº de l'acte de naissance du premier parent 22. date de naissance du second parent 23. lieu de naissance du second parent 24. nationalité du second parent 25. nº de l'acte de naissance du second parent 26. nom de l'agent chargé de la délivrance 27. adresse du lieu de naissance 28. heure de naissance 29. numéro d'identification secondaire 30. remarques

1. Dokumentennummer 2. Geburtsort 3. Geburtstag 4. Geschlecht des Kindes 5. Nachname des Kindes 6. Vornamen des Kindes 7. Geschlecht des ersten Elternteils 8. Nachname des ersten Elternteils 9. Vornamen des ersten Elternteils 10. Geburtsname des ersten Elternteils 11. Geschlecht des zweiten Elternteils 12. Nachname des zweiten Elternteils 13. Vornamen des zweiten Elternteils 14. Geburtsname des zweiten Elternteils 15. Name der ausstellenden Behörde 16. Ausstellungsdatum 17. Ausstellungsort 18. Geburtsdatum des ersten Elternteils 19. Geburtsort des ersten Elternteils 20. Staatsangehörigkeit des ersten Elternteils 21. Nr. des Ursprungsdokumentes des ersten Elternteils 22. Geburtsdatum des zweiten Elternteils 23. Geburtsort des zweiten Elternteils 24. Staatsangehörigkeit des zweiten Elternteils 25. Nr. des Ursprungsdokumentes des zweiten Elternteiles 26. Name des ausstellenden Beamten 27. Geburtsort / Anschrift 28. Uhrzeit der Geburt 29. Nummer der Drittperson (z.B. Zeuge) 30. Bemerkungen

1. documento n. 2. luogo di nascita 3. data di nascita 4. sesso del bambino 5. cognome del bambino 6. nomi del bambino 7. sesso del primo genitore 8. cognome del primo genitore 9. nomi del primo genitore 10. cognome di nascita del primo genitore 11. sesso del secondo genitore 12. cognome del secondo genitore 13. nomi del secondo genitore 14. cognome di nascita del secondo genitore 15. Autorità 16. data di rilascio 17. luogo di rilascio 18. data di nascita del primo genitore 19. luogo di nascita del primo genitore 20. cittadinanza del primo genitore 21. numero del certificato di nascita del primo genitore 22. data di nascita del secondo genitore 23. luogo di nascita del secondo genitore 24. cittadinanza del secondo genitore 25. numero del certificato di nascita del secondo genitore 26. nome del funzionario 27. indirizzo del luogo di nascita 28. ora di nascita 29. numero di identificazione secondario 30. commenti

1. document nummer 2. geboorteplaats 3. geboortedatum 4. geslacht van het kind 5. achternaam van het kind 6. voornamen van het kind 7. geslacht van de eerste ouder 8. achternaam van de eerste ouder 9. voornamen van de eerste ouder 10. geboortenaam van de eerste ouder 11. geslacht van de tweede ouder 12. achternaam van de tweede ouder 13. voornamen van de tweede ouder 14. geboortenaam van de tweede ouder 15. naam van de uitgevende instantie 16. afgiftedatum 17. afgifteplaats 18. geboortedatum van de eerste ouder 19. geboorteplaats van de eerste ouder 20. nationaliteit van de eerste ouder 21. nummer van de geboorteakte van de eerste ouder 22. geboortedatum van de tweede ouder 23. geboorteplaats van de tweede ouder 24. nationaliteit van de tweede ouder 25. nummer van de geboorteakte van de tweede ouder 26. naam van de uitgevende functionaris 27. adres van de geboorteplaats 28. geboortetijd 29. tweede ID-Nummer (functionaris/getuige) 30. beperkingen

1. número de documento 2. lugar de nacimiento 3. fecha de nacimiento 4. sexo del niño 5. apellido(s) del niño 6. nombre(s) del niño 7. sexo del primer progenitor 8. apellido(s) del primer progenitor 9. nombre(s) del primer progenitor 10. apellido de soltero del primer progenitor 11. sexo del segundo progenitor 12. apellido(s) del segundo progenitor 13. nombre(s) del segundo progenitor 14. apellido(s) de soltero del segundo progenitor 15. nombre de la autoridad emisora 16. fecha de emisión 17. lugar de emisión 18. fecha de nacimiento del primer progenitor 19. lugar de nacimiento del primer progenitor 20. nacionalidad del primer progenitor 21. número de credencial del primer progenitor 22. fecha de nacimiento del segundo progenitor 23. lugar de nacimiento del segundo progenitor 24. nacionalidad del segundo progenitor 25. número de credencial del segundo progenitor 26. nombre del funcionario responsable de la emisión 27. dirección del lugar de nacimiento 28. hora de nacimiento 29. número de identificación secundario 30. comentarios

- Double ID3 format, 125 x 176 mm, machine readable by ordinary full-page passport readers, translations on the backside

Harmonized Breeder Documents – Proposal (cont'd)

- Harmonised design and data entries in all EU member states (with additional country-specific information).
- A Europe-wide harmonised numbering system:

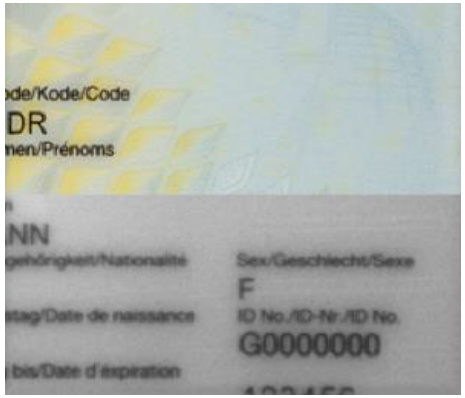
Country code	Issuing authority	Serial number
ABC	12345	XYZ678

- Machine-readable documents can be read **without errors** in a **fast and efficient** way!

Harmonized Breeder Documents – Proposal (cont'd)

(a) Background printing

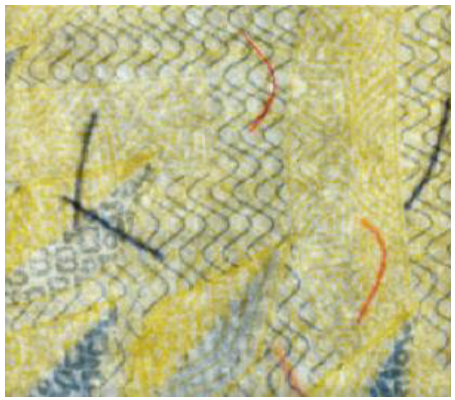
(b) UV-fluorescent overprint



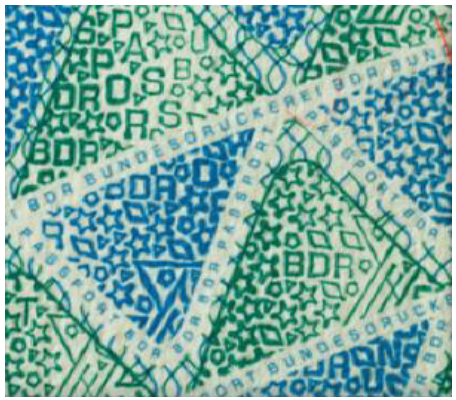
(c) IR-visible/invisible regions

- European Union-wide harmonised minimum standard set for breeder documents.
- Allows for offline verification, avoids counterfeits and falsifications, security features are easily checkable.

Harmonized Breeder Documents – Proposal (cont'd)



(d) Visible fibres

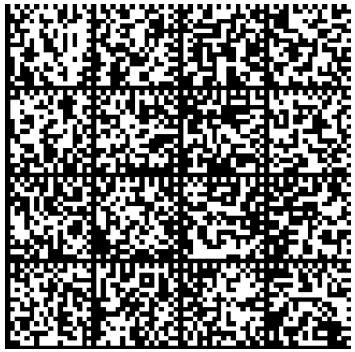


(e) Micro printing

(f) OVSD

- Further recommended security features can be added for each country (if necessary and affordable).
- Paper: at least 50% cotton, no optical brighteners, suitable for inkjet personalisation, containing a watermark

Harmonized Breeder Documents – Proposal (cont'd)



- Datamatrix or QR-Quode contains data entries reference by numbers to document legend (Barcode standard to be decided)
- Barcode for mandatory data entries (and optional including recommended data entries)
- Optional use of barcode for future biometrics!

Integration of Biometrics

- Physiological biometric characteristics represent dynamic biological systems and, thus, are potentially affected by ageing.
- Biometric ageing focuses on questions related to permanence of biometric features, including
  1. the stability of features in templates,
  2. the resulting impact in terms of recognition accuracy, and
  3. the impact of template owner's age on distinctiveness and performance.
- Distinguish between physical ageing and template ageing.

Integration of Biometrics (cont'd)

Characteristic	Ageing effects	Countermeasures	Advantage
Fingerprints	Growth of fingers, loss of collagen, injuries, etc.	Modelling of fingerprint growth	Usability
Iris	Hardy any observed effects (no visual proof)	–	Protected organ, compact repr.
Face	Wrinkles, ageing of the facial skin, morpho-logical changes, etc.	Modelling of facial ageing	Usability

- **Important factors:** cost, acceptance, performance, quality of captured data, ethical issues, etc.

Integration of Biometrics (cont'd)

Research Issues:

- So far research on biometric ageing is limited and,
- there are hardly any large publicly available datasets.

Legal Issues:

- Privacy regulations need to be taken into account when integrating biometrics into breeder documents.

$\Rightarrow$ The vast majority of privacy preserving biometric template protection schemes suffer from biometric performance degradation

Conclusions and Outlook

- The integration of biometric information to breeder documents is essential to provide a strong link between bearer and document.
- However, so far it is not clear which (if any) biometric characteristic is stable for (very) long time-spans.
- Addressing the requirements on privacy protection and ethical issues is a precondition, before biometric reference can be integrated in breeder documents.
- These requirements make an integration of biometrics to breeder documents more challenging!

End

Thank you for your attention!

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